Scaling Pediatric Mental Health Care Through Primary Care Workforce Re-Training: A Task-Shifting Implementation Strategy

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Abstract

Background: Anxiety and depression are among the most prevalent and disabling mental health conditions in children and adolescents, yet they remain under-recognized and undertreated in primary care. Persistent shortages of child mental health specialists in the U.S., Canada, and other countries represent a major implementation barrier to timely access to evidence-based care. Scalable workforce re-training of primary care clinicians represents a promising task-shifting strategy to address this gap.

Methods: We conducted a longitudinal evaluation of 3,246 primary care clinicians across the United States and Canada who participated in a pediatric mental health workforce re-training program between 2017 and 2024. The program combined a 3-day interactive workshop with 6 months of twice-monthly, case-based group coaching and was explicitly designed to support implementation of evidence-based assessment and treatment for pediatric anxiety and depression in primary care. Clinician outcomes were assessed at baseline (T1), post-workshop (T2), and 6-month follow-up (T3), including knowledge, self-efficacy, use of standardized rating scales, and diagnostic and treatment practices.

Resullts: From T1 to T3, clinicians demonstrated sustained improvements across all domains, including increased adoption of evidence-based rating scales, greater willingness to initiate and manage antidepressant treatment, and increased self-efficacy in diagnosis and management. Mixed-effects regression analyses showed comparable outcomes for in-person and live-online delivery modalities, supporting the feasibility of remote implementation at scale.

Conclusions: Intensive, theory-informed workforce re-training can function as an effective implementation strategy to expand primary care capacity for pediatric anxiety and depression across disciplines and health systems. Embedding structured training and longitudinal coaching within routine practice environments may represent a pragmatic approach to addressing workforce-related implementation barriers in pediatric mental health care.

Contributions to the Literature

- Prior studies of pediatric mental health training in primary care have been small, discipline-specific, and short-term, with limited evidence of sustained practice change or scalability across health systems.
- This study presents the largest longitudinal evaluation to date of a pediatric mental health workforce re-training intervention, involving over 3,000 primary care clinicians across multiple disciplines in two countries.
- By explicitly framing re-training as a task-shifting implementation strategy, the study demonstrates sustained improvements in clinician self-efficacy, adoption of evidence-based practices, and willingness to manage anxiety and depression in primary care.
- Comparable outcomes across in-person and live-online delivery modalities support the feasibility of scalable, system-level workforce interventions to address pediatric mental health access gaps.

INTRODUCTION

Anxiety and depression are among the leading causes of disability and diminished quality of life in children and adolescents worldwide. Meta-analyses during and after the COVID-19 pandemic indicate prevalence rates exceeding 20% for depression and 20% for anxiety in young people.[1,2]. Rising trends have been observed not only in the United States but also in Canada, Europe, and Australia, where increased emergency department visits and greater functional impairment highlight a growing public health crisis. These disorders contribute substantially to school disengagement, family disruption, and later-life morbidity.

Despite their prevalence, anxiety and depression in young people are often under-recognized and under-treated in routine health care. Primary care remains the most common entry point for children and adolescents, yet general practitioners, pediatricians, and nurse practitioners consistently report limited preparation for early detection and management of mental health conditions. This gap contributes to delayed diagnoses and missed intervention opportunities, particularly acute in regions with child psychiatry workforce shortages.[3]

The shortage of specialty providers is recognized globally, with up to 70% of U.S. counties lacking a child psychiatrist and similar gaps in Canada and Europe.[4] Health systems have therefore prioritized task-shifting strategies — reallocating certain mental health competencies to non-specialist providers — as a way to expand access. Retraining the existing primary care workforce, rather than relying solely on scarce specialists, is increasingly viewed as a necessary policy response to address the pediatric mental health crisis.[5,6]

Previous interventions have shown that interactive workshops, simulations, and integrated screening tools can improve clinician skills and patient outcomes.[7] However, most have been small-scale, discipline-specific, or difficult to sustain beyond pilot phases. Few have demonstrated the capacity to retrain primary care clinicians across disciplines, at scale, and with longer-term follow-up.[8]

Another limitation of most studies of healthcare provider behavior/practice change is that most research has been based on practical combinations of “what works” empirically, rather than strategies that address the underlying *mechanisms* of behavior change, i.e., basic behavioral science research.[9,10] By contrast, five decades of *consumer/patient behavior change* research in the fields HIV/AIDS, substance use treatment, etc., have demonstrated that basic behavioral and communication science theory and methods can be applied to design effective interventions, identify when and why those interventions work, and when necessary, indicate how to modify the putative “ingredients of change”.[9,11] Applied to healthcare providers, these strategies might more effectively address the underlying cognitive and social-emotional factors influencing clinicians’ decision-making, thereby speeding the adoption of evidence-based practices.[7,10,12]

In this study, we evaluate a six-month-long theory-based workforce re-training program for over 3,000 primary care clinicians (PCCs) — including family physicians/GPs, pediatricians, and nurse practitioners — across the United States and Canada. The program combines an intensive initial workshop with longitudinal case-based coaching, designed explicitly as a task-shifting intervention to embed evidence-based pediatric mental health care within frontline primary care practices. By assessing outcomes across multiple disciplines and both US and Canadian national contexts, we provide evidence for a scalable strategy to strengthen the global primary care workforce in addressing pediatric anxiety and depression.

We address three key questions: 1) given the central role that PCCs might serve as “first responders” for youth with anxiety and depression, do they vary in their initial skills/knowledge/preparedness across primary care disciplines, e.g., family physicians (FPs), pediatricians, and nurse practitioners (NPs), possibly requiring differential preparation? 2) Can an intensive workforce re-training program increase PCCs’ self-reported knowledge, skills and intentions to implement depression- and anxiety-related assessment and management practices, regardless of primary care discipline, and are these effects sustained over 6 months? 3) In addition, beginning in 2020 the emerging COVID-19 crisis forced program developers to develop an alternative workforce training strategy, specifically the use of live-online formats (e.g., Zoom) as a means of delivering its intensive training. Because this workforce retraining program has been continuously deployed since the pandemic in both its face-to-face (FTF) and live-online (ONL) formats, here we also compare the effects of these two intensive 6-month-long programs.

METHODS

Intervention Overview and Design

The BLINDED program begins with a 16-hour, 3-day interactive workshop, conducted either in person or online (via Zoom), followed by 12 twice-monthly small-group tele-videoconference coaching/feedback sessions.[13] The BLINDED workshop content was developed collaboratively by psychiatrists, primary care physicians, and behavior science consultants by first identifying *essential clinical behaviors/skills* needed to diagnose/treat anxiety, depression, suicidality, and other common problems. For all targeted clinical behaviors, developers identified key facts essential to performing each new diagnostic/treatment behavior (i.e., addressing its advantages/disadvantages; PCCs’ common worries/misunderstandings), eliminating *a priori* any content deemed not critical to new behavioral performance. Developers then determined which clinical behaviors required *skills training/coaching* to increase PCCs’ self-efficacy. Given this logic model focusing on teaching *key facts* and *essential skills*, developers anticipated that the intervention would produce changes in PCCs’ *knowledge* and *self-efficacy*, thereby increasing their behavioral intentions (willingness and commitment) to adopt these practices.

To strengthen PCCs’ practice change *motivations*, all faculty are carefully selected from previous PPP alumni, based on personal characteristics of humor, likeability, enjoyment of mentoring, and commitment to evidence-based practices in pediatric primary care. All faculty receive initial and ongoing coaching in

motivational/behavior change techniques, e.g., using implementation intentions, goal-action planning, and “hooks”, and facilitating group discussion.[13–15] All teaching methods/techniques are regularly scrutinized for consistency with findings from behavioral science,[15,16] communication-persuasion science[17] adult education,[18] and cognitive neuroscience.[19,20] In total, 36 different teaching/behavior change techniques have been integrated into the course since initial deployment in 2006 (see BLINDED for complete listing).

Instruction is delivered by a four-member faculty team (2 PCCs, 2 child and adolescent psychiatrists [CAPs], all PPP alumni or course developers). Participants receive comprehensive toolkits with guides, assessment instruments, medication charts, and patient handouts. The initial workshop emphasizes *case-based learning* and practical demonstrations, where faculty model interviewing skills, strategies for engaging families, collecting psychiatric symptom histories, and formulating treatment plans within PCC time constraints.

After the workshop two faculty mentors (one PCC, one CAP) facilitate small group (9–12 PCCs) follow-up tele-videoconference series in 1-hour time blocks. During follow-ups, participants take turns presenting “challenging cases” from their practices, and participants jointly apply the principles and techniques learned during the workshop. The faculty serve as facilitators (rather than “experts”) and involve all learners in case-related problem-solving.

Sample. All 3,425 individuals enrolling in the program from October 2017 to April 2024 were included, including participants from 2 Canada-specific trainings. Participants completed baseline assessments measuring disorder-specific knowledge, self-efficacy, skills, and specific clinical practices for anxiety and depressive disorders. Identical assessments were administered at the end of the workshop and at six months.Table 1 provides sample demographic details.

To enable longitudinal analyses, participants created personal IDs using unique identifiers of their own choosing (e.g., mother's maiden name, birth year). The number of subjects with ID-matched assessments was 3,184 (92.9%) at the workshop’s conclusion and 1,673 (48.9%) at six months. Because these data are collected with no externally discernable identifiers, this work has been determined to be exempt by the Institutional Review Board, BLINDED. All data were coded by 3 assessment time points: before training started (1), at end of the 3-day workshop (2), and at 6 months (3).

Measures. At each timepoint, participants completed a 68-item (theory-derived correlates of behavior change[10,11,15,16,21]) questionnaire concerning their: 1) self-assessed overall *Knowledge* concerning each disorder’s diagnosis or treatment (4-point Likert scale: 1 = not at all, 4 = a great deal); 2) *Self-efficacy* (comfort/confidence diagnosing or treating each disorder, same scale format) and 3) *Behavioral Intentions* (BIs)[16] to conduct specific assessment and treatment practices (scored on clinical behaviors ranging from 1 = refer all cases to 5 = diagnose/manage all cases). Two other domains are also assessed: one separate BI -- to *use standardized rating scales*, separately used for both assessment and treatment monitoring. Rating scales specifically taught during the course included the Patient Health

Questionnaire (PHQ-9) for depression,[22] and Screen for Child Anxiety and Related Disorders (SCARED) for anxiety.[23] One final measure is obtained at each timepoint, *Prescribing self-efficacy* for selective serotonin reuptake inhibitors (SSRIs) (binary: Yes/No). Because these assessments are completed separately for both anxiety and depressive disorders, 16 separate theory-based outcome constructs were evaluated, with *BIs* presumed to be the most proximal outcome to behavior change,[11,16,24] with changes in *Knowledge* and *Self-efficacy* posited to predict/correlate with increases in BIs over time. NB: all study self-report assessments are available on line in supplemental materials.

Statistical Approach. Mixed-effects regression models (MMRM[25–27]) analyzed continuous and ordinal variables, incorporating both random effects (intercepts and slopes, allowing individual variations) and conditional effects (*Time 1,2, or 3; Training Type – ONL vs. FTF*), and their interactions. Potential conditional effects of discipline, gender, time in practice, and sponsor (individual vs. organizational) were evaluated through interaction terms (available from the authors upon request). For the single binary variable (self-reported SSRI prescribing competence), a generalized linear mixed model (GLMM) was used to analyze the outcome (Yes/No) over three time points. The appropriateness of MMRM and the Missing at Random (MAR) assumption was confirmed by analyses of missing data patterns using logistic regression and chi-square comparisons,[25,26] available upon request. Residual diagnostics (QQ plots, histograms) confirmed normality assumptions.[27] Model fit was evaluated via Akaike Information Criterion comparisons.

To test the possible theory-based influences of changes in *Knowledge* and *Self-efficacy* on *Behavioral Intentions* at 6 months, we constructed difference/change variables by subtracting baseline (T1) from post-workshop values (T2) for all disorder-specific Knowledge and Self-efficacy measures, then conducted additional analyses to examine their relationship with the 4 diagnotic and treatment *BI* outcomes at T3 (6-months), including *Training Type* (FTF vs. ONL) in the models.

Given the breadth of study outcomes (16 key variables), only the primary variables of *Time* and *Training Type* (ONL vs. FTF) results are presented; additional moderator analyses (e.g., gender, discipline, time in practice) are available upon request.

RESULTS

Table 1 provides a general description of the sample, including professional discipline, years in practice since completing the highest professional degree, gender, racial/ethnic distribution, and whether the individual enrolled in the training individually or through an organizational sponsor (e.g., hospital, healthcare system, local foundation, etc.). Pediatricians constituted the preponderance of participants, followed by nurse practitioners, family physicians, and others. Most participants were female, and the average time in practice was mid-career. Participation for most enrollees was funded by an organizational sponsor. No commercial companies provided funding.

In Table 2 we present the changes over 3 time points in the two key correlates of *Behavioral Intentions (BIs)*, self-efficacy and knowledge for two disorders, two overarching categories of clinical behavior: assessment/diagnosis and treatment/management, separating presenting means for ONL vs. FTF trainings. To examine these 8 variables (2 disorders x 2 correlates x 2 clinical behaviors [assessing or treating]) over time, MMRM analyses are shown in Table 2. This table illustrates the changes from baseline and over the 2 follow-up assessments, comparing ONL vs. FTF participants. As seen here and the accompanying Fig. 1, significant changes were noted for both *anxiety* and *depression*, for *knowledge* and *self-efficacy*, and for *diagnosis* and *treatment* (see Figure, panels **A** and **B** for two illustrative graphs). Also of note, significant *Training Type* (ONL vs FTF) findings were noted in only one, while *Time x Training Type* interactions were found in six of the 8 analyses. Given the exploratory nature of these unexpected interactions, we report all significance levels after Tukey corrections.

Consistent with behavioral science models described earlier, effective change methods should lead to changes in PCCs' *intentions* (BIs) to apply specific diagnostic and treatment practices. These findings, separated for anxiety and depressive disorders, are shown in Table 3. The expected pre-post effects of *Time* are again present, as well as significant findings for *Training Type* and *Time by Training Type* interactions. Of note, no pair-wise BI differences were found between ONL and FTF either at baseline or at six months, but the immediate post-workshop assessments revealed consistent pairwise differences, with ONL participants showing less immediate pre-post BI change than FTF participants. See Figure panel C for graphic example.

Following our theoretical model, we examined whether increases in knowledge and self-efficacy led to BI changes over time, using MMRM separately for the diagnostic and treatment BIs, each for depression and anxiety disorders. In all 4 models, *Time* was a significant correlate (F range: 903.6–1176.1, all $p < 0.0001$), with changes in diagnostic knowledge, diagnostic self-efficacy, treatment knowledge, and treatment self-efficacy adding significantly to BI increases (F range: 5.85–38.04, all $p < 0.0029$). Across models, *Time* explained approximately 85–90% of the BI variance, while T1-2 changes in knowledge and self-efficacy collectively accounted for the remaining 10–15%. Model fit was strong (R^2_adj range: 0.75–0.81), and random effects explained 44.6–52.7% of total variance at the subject level. A missingness indicator was tested in all models and was not significant, indicating that missing data did not systematically bias results.

Because participants were taught throughout the three days' training to apply rating scales for assessing and monitoring, depression and anxiety disorders, Table 4 presents their current/future BIs to use these measures for screening, assessment, and/or treatment monitoring, e.g., PSC-17 for screening, SCARED for Anxiety, and PHQ9 for Depression. Analyses demonstrated no significant correlations of *Training Type*, but revealed multiple *Time x Training Type* interactions.

GLMM analysis of participants' SSRI prescribing competence (binary, Y/N) was significant (Likelihood Ratio Chi-Square = 804.26, df = 5, p < .0001), revealing increases regardless of training format. Percentages of ONL and FTF participants reporting SSRI prescribing competence rose from 74.2% and

70.1% at baseline (respectively) to 95.8% and 93.7% at 6 months, The Pearson Chi-Square Goodness-of-Fit Test indicated no major concerns with model fit (p = 0.48).

DISCUSSION

Overall results suggest substantial changes in PCCs' MH knowledge, self-efficacy, and practice behaviors over time, but important caveats warrant emphasis. Most importantly, like many real-world educational programs, randomly assigned controls were not available. Attrition (slightly over 50%) could yield spurious/skewed findings or overestimate impacts. That said, six-month results suggested sustained changes with no evident deterioration, regardless of ONL vs. FTF status. Six-month outcomes are infrequently found in studies of typical educational programs, and the notable lack of FTF/ONL differences may offer clues for effective program design in other fields.

Another limitation concerns the possibility of selection/assignment bias: to some degree, all PCCs willingly participated. We speculated that there may have been differences in the level of motivation of those who were subsidized or encouraged by an institutional sponsor. Yet, we found no differences in outcomes across all outcome variables by this binary condition (self vs. institution), nor did it predict differential attrition at 6 months (tables available upon request).

Counterbalancing these concerns, results show changes in both the theory-derived change processes (knowledge and self-efficacy) and their connections to the most robust determinant of actual change – sustained high behavioral intentions over time.[11,16,24] Analyses showed that these 2 change processes provided additional explanatory power, over and above *Time* alone.

Also of note, participants noted substantial changes across 4 classes of behaviors/measures (assessment/diagnostic procedures, treatment/management practices, use of specific rating scales, and SSRI prescribing). Thus, overall changes were found for an array of clinical behaviors, more than for a single simple behavior that might be more easily generated (e.g. handwashing or prescribing a single medicine).

The findings of ONL-FTF mid-point differences (at the end of the third day) may have several explanations. First, peer influences might enhance FTF participants' behavioral intention ratings, given that they complete these measures at the end of the workshop in the presence of their colleagues, all completing the same ratings on cellphones or laptops. In contrast, ONL participants, still online at the end, complete the measures through an online link. A second possibility may be priming or framing effects of location[19]: do PCCs' behavioral intentions differ if answered when away from their home/practice locations, versus at home/online? Lastly, these mid-point differences might reflect true post-pandemic differences in ONL participants' behavioral intentions, perhaps temporarily overwhelmed by new clinical patient responsibilities or a diminished sense of self efficacy. Despite this finding, 6-month findings were virtually indistinguishable (with no evidence of differential attrition in FTF vs. ONL participants), suggesting that ONL participants' behavioral intentions *increased* over time during the 6-

month follow-up videoconferences while the FTF behavioral intentions were maintained. These intriguing questions await further study.

Another important study limitation is that our outcomes analyses were wholly reliant on PCC's self reported practice change intentions. That said, we note that in another BLINDED-conducted study focusing solely on ADHD behavioral intentions, robust correlations were found between PCCs' practice change intentions and their chart-documented practices over the following three months.[28]

As noted by others,[29] other important differences between ONL and FTF trainings warrant mention: Even if comparable in terms of practice change outcomes, ONL formats may offer greater accessibility for rural PCCs and those who cannot travel due to other responsibilities. In addition, costs may be lower, both for individual PCCs and institutional sponsors. Relatedly, we note that one of the independent BLINDED sites, now in its 8th year, has reported that BLINDED trainings generated province-wide (Alberta) healthcare costs savings due to reduced emergency department visits and psychiatric hospitalizations.[30,31]

CONCLUSION

This novel workforce retraining program addresses a key outcome of international concern -- increasing rates of pediatric anxiety and depression in the face of insufficient subspecialty resources. Given these promising findings, attention should be given to further scaling this and other such programs to address the current crisis, and to expand research on theory-based practice change interventions.

Declarations

Ethics Approval: Because all data are collected with no personal identifiers, this work has been determined to be exempt by the Institutional Review Board of the University of Arkansas for Medical Sciences.

Consent for Publication: Not applicable. This reseach was declared "Exempt" by the University of Arkansas for Medical Sciences Institutional Review Board. **Therefore, consent was not required for any participants who shared their anonymous survey data used in this report.**

Clinical trial number: Not applicable.

Availability of Data & Materials: All measures, analyses, and primary data sets are available upon reasonable request.

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Authors' Contributions:*Dr. Peter Jensen conceptualized and designed the study, supervised data collection and analyses, and drafted and revised the manuscript. Drs. Ruth Stein and Lawrence Amsel participated in the conceptualizing and designing the study, participated in drafting the initial manuscript, and critically reviewed and revised the final manuscript. Dr. M. Lynn Crismon participated in designing the intervention program, data analysis and interpretation, and critically reviewed and revised the final manuscript. Dr. Cathryn Galanter drafted and finalized the assessment measures, conceptualized and designed the study, and critically reviewed and revised the final manuscript. The REACH PPP Steering Committee (group author) critically reviewed and approved the final manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.*

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Tables

Tables 1 to 4 are available in the Supplementary Files section.

Figures

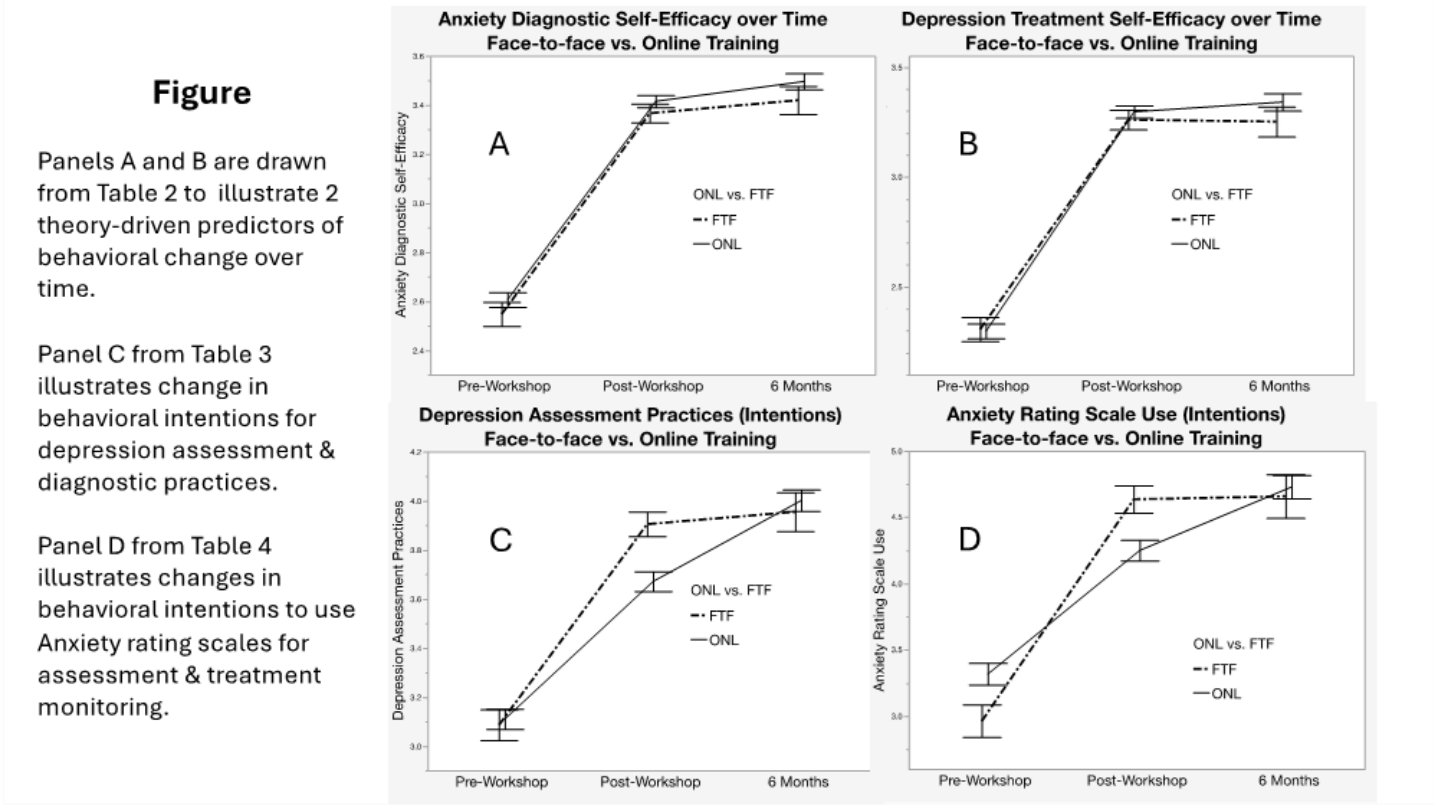

Figure 1

Theory-Derived Correlates of Practice Change By Time and Training Type

Supplementary Files

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- Tables.docx